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Applicants: HSI-CHIN TSAI

Title : INJECTION JOINT FOR AN
INTRAVENOUS (IV) DEVICE TUBE

7 Claims

8 Sheets of Drawings

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1 **INJECTION JOINT FOR AN INTRAVENOUS (IV) DEVICE TUBE**

2 BACKGROUND OF THE INVENTION

3 1. Field of the Invention

4 The present invention relates to an injection joint, and more particularly
5 to an injection joint for a intravenous (IV) device tube to allow a medicinal
6 solution to be added to an IV drip without using a needle without interrupting the
7 IV drip.

8 2. Description of Related Art

9 Since some patients cannot ingest nutrients or medicine orally, nutrients
10 or medicine must be administered in an intravenous (IV) dripcontainer.

11 With reference to Fig. 8, a conventional IV solution container (11) must
12 have an IV tube assembly (not numbered) to connect the IV solution container
13 (11) to a patient (not numbered). The IV tube assembly also controls how quickly
14 the IV solution is administered and provides a means to inject medicine into the
15 IV solution. The IV tube assembly comprises a container needle (13), an upper
16 IV tube (15), a lower IV tube (18), an injection joint (not numbered), a flow
17 control apparatus (19) and a hypodermic needle (21).

18 The upper IV tube (15) has an upper end (not numbered) and a lower end
19 (not numbered).

20 The container needle (13) is eccentric cavity, is connected to the upper
21 end of the upper IV tube (15) and is inserted into the IV solution container (11).

22 One embodiment of the conventional injection joint comprises an
23 intermediate container (16) and a lid (17). The intermediate container (16) has a
24 bottom (not numbered), an open top (not shown) and a discharge outlet (not

1 numbered). The discharge outlet is formed on the bottom of the intermediate
2 container (16) and is connected to the upper end of the lower IV tube (18). The
3 lid (17) has a top (not numbered), an inlet (not numbered) and at least one sealed
4 injection port (not numbered) and is mounted securely on the open top of the
5 intermediate container (16). The inlet is formed through the top of the lid (17),
6 and the lower end of the upper IV tube (15) is connected to the inlet. The at least
7 one sealed injection port is tubular and has an internal passage (not shown) and
8 an internal resilient seal (not shown). The internal passage passes through the lid
9 (17) so a hypodermic needle (not shown) on a syringe (not shown) can puncture
10 the resilient seal and inject medicine into the intermediate container (16).

11 The flow control apparatus (19) is mounted around the lower IV tube (18)
12 to control how quickly IV solution flows to a patient.

13 The hypodermic needle (21) is connected to the lower end of the lower
14 IV tube and is inserted in a patient's vein so the IV solution can be administered
15 to a patient.

16 With reference to Fig. 9, another conventional injection joint is a Y-
17 shaped tubular connector (10) and has an inlet (not numbered), a sealed injection
18 port (12) and an outlet (not numbered). The inlet is connected to an IV solution
19 container (not shown) through an upper IV tube (not shown), and the outlet is
20 connected to a hypodermic needle (not shown) through a lower IV tube (not
21 shown). The sealed injection port (12) is sealed with an internal resilient plug
22 (14).

23 Since some patients need intravenous medication in addition to an IV
24 solution, medication can be injected into the IV solution through the sealed

1 injection port (12). A syringe (20) with a needle (22) is used to inject the
2 medication by puncturing the resilient plug (14) with the needle (22). The
3 medication in the syringe (20) is injected into the sealed injection port (12).

4 However, use of a syringe (20) with a needle (22) inherently subjects
5 medical personnel to the possibility of injury. A contaminated needle (22) can
6 transfer diseases to a people stabbed with the contaminated needle (22). Not
7 using a needle (22) will improve the safety to medical personnel when injecting
8 medication into the sealed injection port (12).

9 SUMMARY OF THE INVENTION

10 The main objective of the present invention is to provide an injection
11 joint for an IV device tube to add medication to an IV solution without using a
12 needle.

13 To achieve the objective, an injection joint for an IV device tube in
14 accordance with the present invention comprises a connector with a sealed
15 injection port. The sealed injection port has an injection port socket, a resilient
16 plug and a cap. The resilient plug is mounted in the injection port socket and has
17 a tapered flange and multiple through holes. The cap has an threaded nipple and
18 is securely mounted in the injection port socket and around the resilient plug.
19 The tapered flange of the resilient plug blocks the threaded nipple. When adding
20 a liquid medication to the injection joint, a syringe without a needle has an inner
21 threaded opening is screwed onto the threaded nipple of the cap. Pressure
22 applied to the liquid medication by the syringe pushes the tapered flange into the
23 cap and the liquid medication passes through the through holes, into the injection
24 port socket and mixes with the IV solution. The present invention improves the

1 safety when injecting a liquid medication into the injection joint.

2 Further benefits and advantages of the present invention will become
3 apparent after a careful reading of the detailed description with appropriate
4 reference to the accompanying drawings.

5 BRIEF DESCRIPTION OF THE DRAWINGS

6 Fig. 1 is an exploded perspective view of a first embodiment of an
7 injection joint for an IV device tube in accordance with the present invention;

8 Fig. 2 is a cross sectional side plan view of the injection joint in Fig. 1;

9 Fig. 3 is a cross sectional side plan view of a resilient plug in the
10 injection joint in Fig. 1;

11 Fig. 4 is a cross sectional top plan view of the resilient plug along line
12 4-4 in Fig. 3;

13 Fig. 5 is an operational cross sectional side plan view of the injection
14 joint in Fig. 1 when liquid medication is injected into the injection joint;

15 Fig. 6 is a cross sectional side plan view of a second embodiment of the
16 injection joint for an IV device tube in accordance with the present invention;

17 Fig. 7 is a cross sectional side plan view of a third embodiment of the
18 injection joint for an IV device tube in accordance with the present invention;

19 Fig. 8 is a perspective view of a conventional IV device in accordance
20 with the prior art; and

21 Fig. 9 is an operation perspective view of a second embodiment of a
22 conventional injection joint for an IV tube in accordance with the prior art when
23 a syringe with a needle injects liquid medication into the injection joint.

24 DETAILED DESCRIPTION OF THE INVENTION

1 An injection joint for an intravenous (IV) device tube in accordance with
2 the present invention comprises a connector with a first internal passage, an inlet,
3 an outlet and a sealed injection port. The inlet is connected to an IV container
4 through an upper IV tube and communicates with the first internal passage in the
5 injection joint. The outlet is connected to a hypodermic needle through a lower
6 IV tube and communicates with the first internal passage of the injection joint.

7 With reference to Figs. 1, 2, 6 and 7, the sealed injection port comprises
8 an injection port socket (31), a resilient plug (40) and a cap (50). The injection
9 port socket (31) is formed on the connector (30, 30a, 30b) and has a proximal end
10 (not numbered), a distal end (not numbered), a bottom plane (34), a sidewall (not
11 numbered), a protrusion (35) and an annular groove (33). The bottom plane (34)
12 has a center (not numbered). The protrusion (35) has a top (not numbered) and a
13 second internal passage (32) is formed integrally with and extends from the
14 center of the bottom plane (34) of the injection port socket (31) and may be
15 tapered. The second internal passage (32) communicates with the first internal
16 passage in the connector (30, 30a, 30b). The sidewall has an inner face (not
17 numbered) with a bottom (not numbered). The annular groove (33) is formed
18 around the bottom of the inner face of the sidewall.

19 With further reference to Figs. 3 and 4, the resilient plug (40) has a neck
20 (42), a bottom tube (44), an eccentric cavity (43), a tapered flange (46) and an
21 annular shoulder (48). The neck (42) is cylindrical and has a top (not numbered)
22 and a bottom (not numbered), and the eccentric cavity (43) is formed inside the
23 neck (42). The eccentric cavity (43) may be formed in about half of the neck (42).
24 The tapered flange (46) is formed integrally with and extends upward and tapers

1 out from the top of the neck (42). The bottom tube (44) is formed integrally with
2 and extends downward from the bottom of the neck (42) and has at least one
3 annular constriction (47) and multiple through holes (45). The bottom tube (44)
4 is larger than the neck (42) and the annular shoulder (48) is formed where the
5 bottom tube (44) joins the neck (42). The annular constriction (47) is formed
6 around the bottom tube (44). Multiple through holes (45) are formed near the
7 annular shoulder (48) and passed through the bottom tube (44). The bottom tube
8 (44) may taper out toward the bottom to fit over the protrusion (35) in the
9 injection port socket (31). The bottom tube (44) is mounted on the protrusion (35)
10 in the injection port socket (31).

11 The cap (50) has a distal end (not numbered), a proximal end (not
12 numbered), a threaded nipple (52) and a mounting ring (56). The threaded nipple
13 (52) is formed integrally with and extends upward from the distal end of the cap
14 (50), has an internal surface (not numbered), a top end (not numbered), a bottom
15 (not numbered) a tapered opening (54) and an axial passage (not numbered). The
16 tapered opening (54) is formed in the top end of the threaded nipple (52) and
17 communicates with the axial passage. The tapered opening (54) corresponds to
18 the tapered flange (46) on the resilient plug (40). The neck (42) of the resilient
19 plug (40) is mounted in the axial passage in the threaded nipple (52), and the
20 tapered flange (46) on the resilient plug (40) closes the tapered opening (54) in
21 the threaded nipple (52). The annular shoulder (48) of the resilient plug (40)
22 abuts the bottom of the threaded nipple (52). The mounting ring (56) is formed
23 integrally with and extends downward from the proximal end of the cap (50) and
24 has an annular lip (58). The mounting ring (56) is mounted in the injection port

1 socket (31). The annular lip (58) is formed integrally with and extends radially
2 out from the mounting ring (56) and corresponds to the annular groove (33) in
3 the injection port socket (31). The annular lip (58) is securely mounted in the
4 annular groove (33) to securely hold the cap (50) in the injection port socket (31)
5 and around the resilient plug (40).

6 With reference to Figs. 1, 2 and 6, a first and a second embodiment of the
7 connector (30, 30a) of the injection joint for the IV device tube in accordance
8 with the present invention is a tubular connector (30, 30a). The first embodiment
9 of the tubular connector (30) is Y-shape, and the second embodiment of the
10 tubular connector (30a) is T-shaped. The tubular connectors (30, 30a) each has
11 an inlet (not numbered), an outlet (not numbered), a first internal passage and an
12 injection port. The inlet is connected to an IV container (not shown) through an
13 upper IV tube (not shown) and communicates with the first internal passage. The
14 outlet is connected to a hypodermic needle (not shown) through a lower IV tube
15 (not shown) and communicates with the first internal passage. The injection port
16 communicates with the second internal passage (32) in the injection port socket
17 (31).

18 With reference to Fig. 7, a third embodiment of the injection joint in
19 accordance with the present invention has a connector (30b) with a different
20 structure. The third embodiment of the connector (30b) has a lid (70) and an
21 intermediate container (72). The intermediate container (72) has a top (not
22 numbered), a bottom (not numbered), a wide upper opening (not numbered) and
23 an outlet (not numbered). The lid (70) has an inlet (not numbered) and at least
24 one sealed injection port (not numbered). The inlet is connected to an IV solution

1 container (not shown) through an upper IV tube (not shown). The at least one
2 sealed injection port is the same as previously described. The outlet is connected
3 to a hypodermic needle (not shown) through a lower IV tube (not shown).

4 With reference to Fig. 5, a syringe (60) without a needle and with an
5 inner threaded opening (61) and a plunger (not numbered) with a head (62)
6 slidably received in the syringe (60) is used to inject a medicinal solution into the
7 injection joint. When adding a medicinal solution to an IV solution (not shown)
8 through the injection joint, the inner threaded opening (61) is screwed onto the
9 threaded nipple (52) of the cap (50). Pushing the plunger causes the head (62) on
10 the plunger to push the tapered flange (46) of the resilient plug (40) into the axial
11 passage in the threaded nipple (52). The pressure of the liquid medicine on the
12 resilient plug (40), the annular constriction (47) in the bottom tube (44) and the
13 eccentric cavity (43) in the neck (42) cause the neck (42) and tapered flange (46)
14 of the resilient plug (40) to collapse and open the axial passage in the threaded
15 nipple (52). The medicinal solution can pass through the through holes (45) in
16 the resilient plug (40) and the internal passage (32) in the injection port socket
17 (31).

18 In the present invention, the tubular connector (30, 30a, 30b) does not
19 use a needle to add a medicinal solution and improves the safety to the medical
20 personnel.

21 Although the invention has been explained in relation to its preferred
22 embodiment, it is to be understood that many other possible modifications and
23 variations can be made without departing from the spirit and scope of the
24 invention as hereinafter claimed.